2 Sheets—Sheet 1.

J. DAVENPORT.

ROTARY-ENGINE.

No. 193,229. Patented July 17, 1877.

Fig. 1.

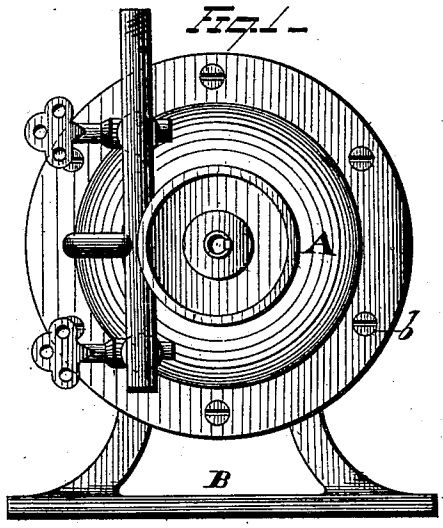


Fig. 2.

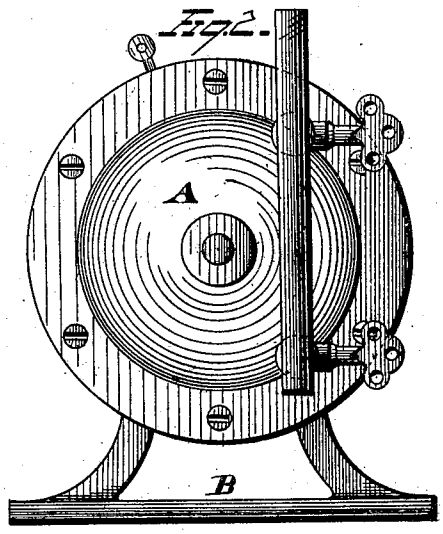


Fig. 3.

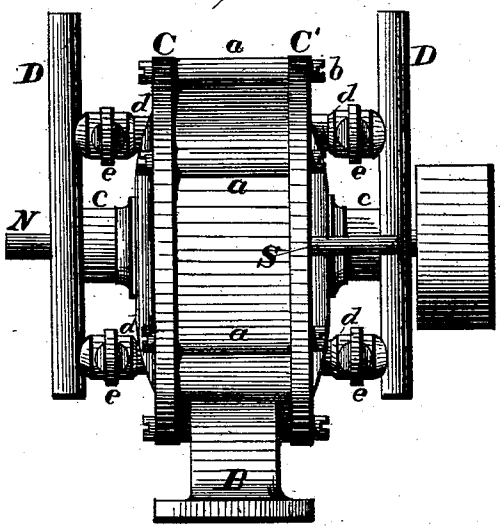
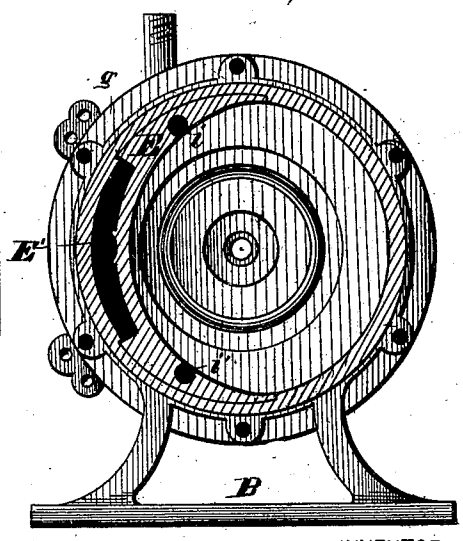


Fig. 4.



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2 Sheets—Sheet 2.

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Fig. 5.

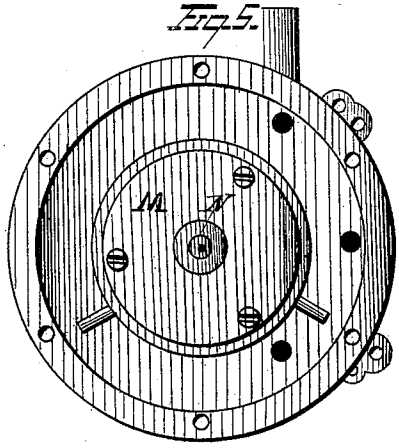


Fig. 6.

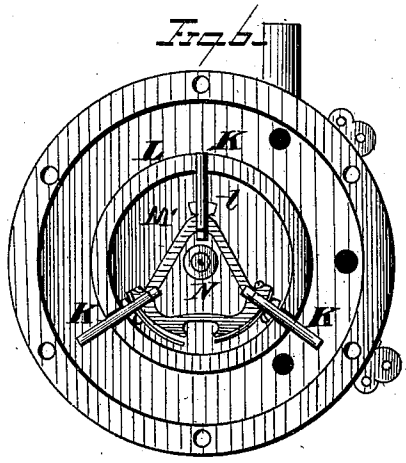


Fig. 7.

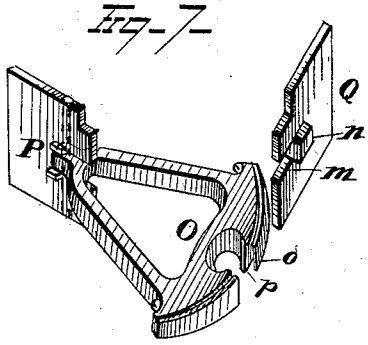
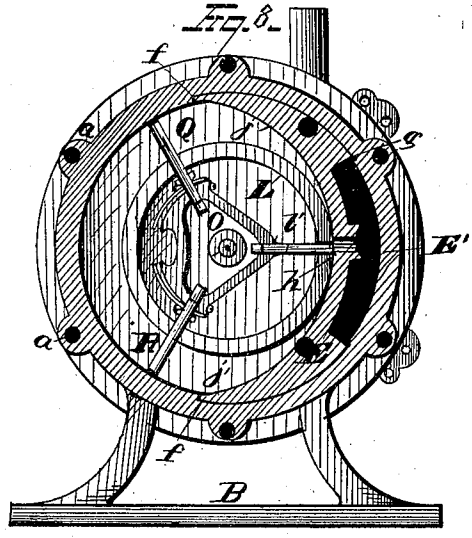


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOSEPH DAVENPORT, OF MASSILLON, OHIO.

IMPROVEMENT IN ROTARY ENGINES.

Specification forming part of Letters Patent No. **193,229**, dated July 17, 1877; application filed February 15, 1877.

To all whom it may concern:

Be it known that I, JOSEPH DAVENPORT, of Massillon, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improved rotary engine.

Figures 1 and 2 represent side elevations of my improved engine. Fig. 3 is an end view of the same. Fig. 4 shows the cylinder with one head removed, and Fig. 5 represents the head of the cylinder having the revolving piston secured thereto; and Fig. 6 shows the cap removed from the revolving piston. Fig. 7 represents the pendulum having the wings attached thereto. Fig. 8 is a side elevation of the cylinder and piston with head removed.

A designates the cylinder of the engine, which is supported upon a standard or base, B, preferably cast solid with the cylinder. The cylinder A is constructed with bosses *a*, which are bored out and threaded for the reception of screws or threaded bolts *b*, to secure the cylinder-heads C C′. Each cylinder-head is provided with bearings *c*, properly packed to prevent the escape of steam, and furnished with oil-holes for lubricating the driving-shaft of the engine. D D′ are the respective steam and exhaust pipes of the engine, and they are connected by means of branch pipes with ports in the upper and lower portions of the cylinder. Each branch pipe *d* is provided with a steam valve or cock, *e*. Within the interior of cylinder A, and to the periphery thereof, is fitted and secured an inclined abutment, E. This abutment is preferably secured to the cylinder by means of undercut grooves *f*, so that the abutment may be removed when worn and a new one inserted therefor.

Abutment E is cut away on its rear side at *g*, forming a steam-space, E′, which connects with the inside of the cylinder by means of one or more ports *h*.

One side or edge of cylinder A is provided with steam-openings *i i′*, leading to the interior of the cylinder, and the opposite side with exhaust-passages *j j′*, through which steam may escape from the cylinder into the exhaust-pipe.

L is the revolving piston, and is rigidly keyed to the driving-shaft.

The periphery of piston L has transverse slots K cut therein, and the heads M M′ are formed with radial grooves *l l′*, leading from the driving-shaft N to the slots K.

O is a pendulum-link, to one end of which is pivoted the wing P, said wing being placed within the slot K, and adapted to move backward and forward therein. Wings Q R are slotted at *m*, and are provided with reenforced rocking-bearings *n*, which rest upon flat steel springs *o*, pivoted to the curved portions *p* of pendulum-link O. By means of this arrangement of parts the wings are connected in such a manner that they are free to move in either direction, and the spring *o* serves to take up any lost motion of the wings, and force them outwardly against the inner surface of the main cylinder.

The steam-pipe D is provided with a branch pipe, S, which is always open to receive steam whenever either the upper or lower steam-cock is opened. Pipe S connects with and delivers steam to the steam space E′, where it exerts pressure through the steam-passages leading to the cylinder on the periphery of the revolving piston, and equalizes the pressure on the same.

The revolving piston is of such size that when in position for use it moves in direct contact with the central portion of the incline or abutment E, thereby cutting off all communication between the steam and exhaust ports.

The operation of my improved rotary engine is as follows: When it is desired to run the engine from left to right the upper steam-cock is opened and the lower one closed, and the upper exhaust-cock is closed while the lower one is opened.

As steam enters the upper portion of the cylinder it exerts its pressure between the stationary and immovable abutment and one of the wings attached to the revolving piston, and operates to force the piston from left to

right. Steam will remain between the wings as the piston revolves until one of the wings passes the exhaust-port situated at the lower side of the cylinder, when the contained steam will be exhausted through the exhaust-pipe D′.

As live steam is continually entering the steam-space in rear of the abutment, the piston will always be subjected to an equalized pressure.

When it is desired to reverse the engine, the lower steam-cock is opened and the upper one closed, while the lower exhaust-cock is closed and the upper one opened. Steam-pressure will then exert itself between the lower portion of abutment E and the wing attached to the revolving piston, while steam on the opposite side of the abutment has a free exhaust into the exhaust-pipe D′.

It is evident that I may apply any suitable packing to the ends and sides of the wings.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the piston of a rotary engine, of movable wings secured to a pendulum-link, substantially as and for the purpose set forth.

2. The combination, with the piston of a rotary engine, of movable wings, one of which is pivoted to a pendulum-link while the others are removably secured thereto, substantially as and for the purpose set forth.

3. The combination, with the pendulum-link, of the springs and detachable wings, provided with re-enforce rocking-bearings, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of February, 1877.

JOSEPH DAVENPORT.

Witnesses:
ISAAC H. BROWN,
JAMES BAYLISS.